VI.—ON -ΣΣ- AND -Z-.

When we compare Homeric words containing -σσ- with their later forms, we notice that Homeric -σσ- corresponds sometimes to later -σ-, sometimes to that -σσ- which is represented in Attic, Boeotian and Cretan by -ττ-. The examples I shall take to illustrate these changes are τελέσσαι, ποσσί, πράσσειν, || τελέσαι, ποσί, πράσσειν. There are three theories which might account for this variation: (i) That the Homeric -σσ- was in one or both of these cases not the historical antecedent of the later form. (ii) That the Homeric -σσ- developed differently in different circumstances. (iii) That the Homeric -σσ- represented two sounds, which developed independently.

Now, as to the first theory, difficult though it may be to establish a historical connexion between the language of Homer and any later dialect, still, few scholars would be willing to deny such a connexion, for without it a large part of Greek Philology would be reduced to guess-work. In the present case some evidence of the connexion can, I think, be adduced. The change from τελέσσαι, ποσσί to τελέσαι, ποσί, is phonetically simple when we bear in mind that we have to do, in the first case with I.E. $s+s$, and in the second with $d+s$. Nothing intervenes to break the series $s+s$, long *ss*, short *s*. A comparison of the usages within the Homeric poems themselves also throws light on this subject. Comparing Iliad I–VI (omitting the Catalogue) with Odyssey XXI–XXIV, we find:

	Iliad.	Odyssey.
instances of -σσ- in fut. and aor. forms,	104	72
" -σσ- in dat. plur.,	142	59
" -σ- in fut. and aor. forms,	71	79
" -σ- in dat. plur.,	25	16

Such figures as these cannot, I admit, be pressed to prove very much. Not only does Homer use many forms in -σσ- without any philological justification, but rhythm and set phrases materially affect the numbers; for example, ἔπεσι is rare throughout Epic compared to ἔπεσσι or ἐπέεσσι, while on the other hand the

phrase *σὺν τεύχεσι* almost ousts the form *τεύχεσσι*. Nevertheless, the coexistence of *-σσ-* and *-σ-* in early Epic, and the growth of *-σ-* at the expense of *-σσ-*, particularly in verb-forms, in the later Epic, seem to establish the historical connexion.

As to the relationship of Homeric *πράσσειν* to the later *πράσσειν*, to admit the descent of the latter from the former drives us to hypothesis (ii) or (iii) in order to explain the variation, while to deny it seems impossible, since there is not the slightest evidence of any difference between the two.

To establish the descent of *-ττ-* from *-σσ-* is slightly more difficult, since Attic gives us no hint of any form previous to *-ττ-*. The earliest Cretan inscriptions, however, do give evidence of the period before *-ττ-*, and if we may assign the same value and history to Attic *-ττ-* as to Cretan *-ττ-*, this gives considerable help. The Cretan forms I shall discuss presently.

As to the second possible theory given above, that the difference between *-σσ-* and *-σ-* was due to circumstances of accent, position in the word, etc., it would, I think, be impossible to apply it consistently. There remains the third possibility, that *-σσ-* in Homer represented more than one sound; what, then, are the sounds that we are to assume to have been expressed by *-σσ-*? In the first place, I see no other value for the *-σσ-* of *τελέσσαι, ποσσί*, except dental *s*, either doubled or, more probably, lengthened. The other value must be assigned to that Epic *-σσ-* which is represented in later Ionic by *-σσ-* and in Attic, etc., by *-ττ-*, that is, the Epic *-σσ-* which arises from Ur. Gk. *κ̯, χ̯, τ̯, θ̯*. It is hardly necessary to give examples of this well-known change; but I must emphasize the fact that my view differs from that of Brugmann in supposing a far closer connexion between the dental *-σσ-* and the guttural *-σσ-*. Brugmann supposes the former to have been *-ss-* in prehistoric Greek, and thus makes a form like *μέλιττα* difficult to explain; while the guttural *-σσ-* || *-ττ-* he takes to be divergent developments from some Ur. Gk. spirant. I think the two sets of forms can be better explained together. We have *-σσ-*, which is not *-ss-*, arising from *κ̯* and *τ̯*; the obvious value to assign to *-σσ-* is *š*. Both changes are illustrated by the English word *conscientious*, but although the two sounds are now identical in English, the first must have been originally a palatal *š*, which we may write *ᵏš*, while the latter was a supra-dental *š* (*ᵗš*). The importance of this difference will appear later.

Contrast with the simple and natural change from κι̯, τι̯ to š, the series assumed by Meyer (Gr. Gr.[3], §282), *tj—tz—ts—ss*. The first step in this series is unexampled and improbable, since the change in the position of the vocal organs from *j* (= i̯) to *z* is no slight one. In the second place, why did not the *ss* from this *ts* become *s* in Attic as it does where *s* follows a dental stem? The only way to meet this objection is to suppose that the change τι̯—*ss* was not completed till after dental+*s* had become *s*; that is to say, there was a time when -σσ- from ti̯ had a different value from that of -σσ- from *ts*; and that period is attested by the Homeric poems. Moreover, how is -σσ- from κι̯ to be explained as -*ss*-? The union of κι̯ and τι̯ in -σσ- is to my mind the greatest proof of the existence of š as a stage of the development. The next point to discuss is the treatment of this š in later Greek. Attic, Boeotian and Cretan treated it in a manner markedly different from dental *s*; they lisped it to þ, which is now commonly regarded as a phonetic approximation to the sound of -ττ-. Ionic and the other dialects retained the symbol -σσ-, and possibly retained the sound š. Smyth (Ion. Dial., §375) hints that -σσ- was not a pure sibilant. The transliteration of -σσ- into Latin as *x* (e. g. in *Ulixes, malaxo*) seems to show that Greek -σσ- was not Latin -*ss*-, though Greek -σ- was Latin -*s*-. Inscriptional evidence is also forthcoming. The sign T at Halikarnassus and Mesembria interchanges with -σσ- (see Meyer[3], l. c., note). Now, if -σσ- was pronounced -*ss*-, there was no need for another sign; whereas, if -σσ- was not -*ss*-, an attempt at a more exact representation was natural; and even if, as some say in order to minimise the importance of the sign, it represented a local pronunciation, why did the provincialism affect only the sibilant which the other Ionians wrote double, not that which they wrote single?

What, then, was the value of Ionic -σσ-? It was a sound so close to *s* that ancient writers give us no hint of any difference, nor has any difference survived in Modern Greek. On the other hand, it was sufficiently unlike to have a different representation, namely the doubled sigma, since doubled dental *s* had been reduced to -σ- in Ionic, and to have also a different method of transliteration into Latin. The sound that answers to this description is š, and we may conclude that Ionic has remained at the same stage from which Attic, etc., have advanced a step further. Such a conclusion, however, is not likely to go unchal-

lenged. Dr. Blass scouts the idea of the existence of the sound š in Greek; he says (Aussprache, p. 92): "Boeckh was inclined to regard this" (such spellings as εἴσστην) "as an indication of the sound š, and his suggestion has found many to repeat it; it is, however, as unwarrantable as it is unmaintainable, and is at present given up. The sound š is unknown even in cultivated modern Greek: and if the ancients had possessed it, they would doubtless have made use of the proper Phoenician symbol to express it." Against this it may be argued that the phonetic correspondence of modern to ancient Greek is so slight that the fact that the sound š has not survived to the 19th century A. D. cannot at all disprove its existence in the 5th century B. C. Secondly, so little is known for certain about the relationship between the Greek sibilant signs and their Phoenician prototypes, that it is difficult to say what Phoenician sign would represent š in Greek. Without dwelling unduly on this point, I may give the following sketch of the question, abstracted from Taylor, History of the Alphabet, II, p. 95; Roberts, Greek Epigraphy, p. 8, and Hinrichs, Gr. Epigraphik, in Müller's Handbuch.

The Semitic alphabet possessed the following sibilant signs:

	Numerical order.	Sign.	Name.	Value.
i	7	I	Zayin	*ds, z*
ii	15	⧺	Samekh	*s*
iii	18	⋀	Tsade	*ts, ss*
iv	21	W	Shin	š

Corresponding to these, we have in the oldest Greek alphabets, the Western alphabets of Caere and Formello:

i	7	I	Zeta (= 3d name above)	*ds, z*
ii	15	⊞	? (Xi = 4th name above in Eastern)	? (= *x* in Eastern)
iii	18	⋀, M	San (? = 1st name above)	*s* (?)
iv	21	≷	Sigma (? = 2d name above)	*s*

The value of the sign I is fixed in nearly all Greek alphabets: the value of ⊞ in the Western group is unknown: perhaps it was merely numerical; in the Eastern group it has the form Ξ and the value *x*. Hence, if any alphabet were found that used both the remaining signs, it would be natural to assign to one of them the value *s*, and to the other the value š. Now at Halikarnassus, Teos and Mesembria the two signs are found in use, and

one of them, in the form T, which is taken to be a variant of M, does represent a sound which on phonetic grounds I take to be š. Professor Ramsay (Jour. Hell. Stud. I) derives the sign from an Asiatic source; but its use at Mesembria, a Megarian colony founded by Chalcedon and Byzantium, makes this less probable, since Asiatic influence could hardly have so wide a range. Other alphabets possessed either M or Ϟ only and used them to represent -σ- or -σσ- indiscriminately. The confusion between the signs M and Ϟ is shown by the alphabets of Corinth and Metapontum, which put M after P in the place of Ϟ.

On early monuments no difference whatever is made between -σ- and -σσ-, but both are written Ϟ or M. It was only at a later period that ϞϞ is written, and at all times Ϟ appears sporadically instead, while I can find no instance of double M. The adoption of the double sign was, I think, an attempt to distinguish between two closely similar sounds, and the point on which the distinction was based was the fact that the prosodial effect of š, like that of ρ, was that of a double consonant, while s did not "make position." In early times, then, Ϟ represented (i) dental s, as in λῦσαι; (ii) the same sound doubled or lengthened in δικάσσαι; (iii) š in πράσσειν. At a later period the sound of (ii) became short in the dialects of Attica and Ionia, but where in the older literature it made position, it was written double; then, since š likewise made position, that too was written -σσ-. The reason for the prosodial weight of š I shall discuss later.

So much, then, for the sign T with the value š. Turning now to the ancient Cretan inscriptions, given by Comparetti (Mus. Ital. III), I shall endeavour to prove the existence of the sound š there too. In the archaic Cretan inscriptions the sign I represents a sibilant arising from at least four different sources:

(i) In IOOI and -AIEN, I corresponds to Attic ζ, later Cretan δ-, -δδ-.

(ii) In OIOϞ, I arises from I.E. *tį*, and corresponds to Epic -σσ-, Ionic-Attic -σ-, later Cretan -ττ-.

(iii) In ANΔAIAΘAI (= ἀναδάσασθαι), I comes from -*ts*-, and corresponds as in (ii).

(iv) In FOIIHA (= Epic οἰκῆα), I represents a peculiar archaic Cretan palatalization of κ, unknown elsewhere.

Of these four varieties of I, the last three certainly represent voiceless sounds; the origin of (ii) and (iv) point to a š sound, while the later representation of (ii) and (iii) by -ττ- points to a

sound which was not dental *-ss-*. I consider that the sound of I in these three cases was *š*, and that these archaic inscriptions, which are assigned to the 7th century B. C., preserve evidence of a period, unattested by monuments in Attica or Boeotia, before *š* became *þ*.

The next question that must be considered is the difference between the guttural *š* and the dental *š*: this difference manifests itself in the passage of dental *š* to dental *s* under certain conditions, whereas the guttural *š* never becomes *s*. Brugmann considers that *-σσ-* from *τι̯*, *θι̯* regularly passed to *σ* both after consonants and between vowels, and explains forms like *ἐρέσσω*, *κρέσσων* (Att. *ἐρέττω*, *κρείττων*) as analogical. But how can *οἰνοῦττα*, *μέλιττα* be explained on this theory? *ἐρέσσω* may perhaps follow *πράσσω* and *κρείσσων* follow *ἥσσων*, through parallelism of meaning, as Brugmann says. But I cannot see what analogy can retain the large class of feminines in *-εσσα* and *-ασσα*. It cannot be denied that analogy has affected Epic verb-forms in *-σσ-* and *-σ-*; but in such cases analogy is quite as likely to work one way as the other; still, *νεμεσῶμαι* beside *νεμεσσῶμαι* is the only example of a verb with *-σ-* from *τι̯* that I can discover, whereas *ἐρέσσω*, *ἱμάσσω* and *λίσσομαι* all show *-σσ-*, and Attic *βλίττω* shows *-ττ-*. Putting aside, then, verbal forms as ambiguous, we have two cases in which *-σσ-* from *τι̯* becomes *-σ-*, namely: (1) after a nasal consonant; e. g. *τιθεῖσα* from **τιθεντι̯α*, **τιθενσα*; the presence of a nasal consonant does not affect *-σσ-* from *κι̯*; e. g. *ἄσσων* from **ἀγχι̯ων*. Without the nasal consonant we have, beside Skt. *ápavatī*, Gk. *ὀπόεσσα*, for **ὀπο-Ϝασσα*, with the strong vocalism of the masculine; so also, beside Skt. *satī*, Gk. *ἑασσα*, for **es̥nt̥i̯a*, by the side of feminine participles which have the strong stem of the masculine as *οὖσα*, *ἔουσα*, for **esontɨa*. Brugmann (II 400) gives *ἀέκασσα* and perhaps *πρόφρασσα* and *θέρμασσα* as weak feminine participles.

(ii) The second case of the reduction of *-σσ-* from *τι̯-* *θι̯-*, to *-σ-* occurs in the three sets of words:

μέσσος, Ion.-Att. *μέσος*, from **μεθι̯ος*,
τόσσος, *πόσσος*, etc., Ion.-Att. *τόσος*, from **τοτι̯ος*,
πρόσσω, *ὀπίσσω*, Ion.-Att. *πρόσω*, from **πρότι̯ω*.

Brugmann notices that in these cases Cretan and Boeotian show *-ττ-*; e. g. Boeot. Cret. *ὅποττος*, Cret. *μέττον*. Accordingly, if Attic *μέσος* is a reduction from Homeric *μέσσος*, the change must be pre-historic, since *-σσ-* is not to be found in Attic, and *-ττ-* could

not have been reduced to -σ-. The antiquity of the forms μέσος, etc., is attested by their frequency in the Homeric poems, though they are not so common as μέσσος, etc. In Iliad I–VI (omitting the Catalogue) occur

μέσσος 6 times, ὅσσος, etc., 17 times, πρόσσω, etc., 9 times;
μέσος 2 times, ὅσος, etc., 5 times, πρόσω, etc., 1 time.

Total with -σσ-, 32; with -σ-, 8. In Odyssey XXI–XXIV occur

μέσσος 5 times, ὅσσος, etc., 17 times, πρόσσω, etc., 3 times;
μέσος 2 times, ὅσος, etc., 10 times, πρόσω, etc., 1 time.

Total with -σσ-, 25; with -σ-, 13. The proportion of forms with -σ- to those with -σσ- is thus twice as great at the end of the Odyssey as at the beginning of the Iliad. We can thus see -σσ- passing to -σ- before our eyes: but why it should do so in these forms and not in χαρίεσσα, etc., is not clear. The only point of resemblance between the sibilant of μέσσος, τόσσος and πρόσσω as opposed to that of χαρίεσσα, is that the former is preceded by an accented vowel, while the vowel before the latter is unaccented. But even this distinction does not appear in the case of κρείσσων, which, since it should be more properly κρέσσων, a form which is found in Ionic, might be expected to occur as *κρέσων.

Although the connexion between this position of the accent and the change of $^{t}\check{s}$ to s is not clear, the closer approximation to s of $^{t}\check{s}$ as compared with $^{k}\check{s}$ makes the change less surprizing. We may suppose that the lengthening of the vowel in τιθεῖσα, due to the absorption of the nasal, obscured the sibilant sound, and perhaps assisted by τιθείς with dental s, led to its passage to s: while the position of the accent in μέσος may have had a similar effect. The two cases cannot be considered parallel, since the first was proethnic, whereas the second was not completed till the Homeric period. The difference is well illustrated by Cretan and Boeotian, which show -σ- in the first case, but -ττ- in the second.

These two dialects show such a curious likeness in their use of the group -ττ- that they deserve special mention. They are the only dialect areas outside Attica that show the lisped $\check{s}$, and when we consider that there was no great connexion between them, the similarity of their usages is startling.

In Crete the sound arising from $\kappa_{\underline{i}}$, $\tau_{\underline{i}}$ is represented in four different manners at four different periods, the latest embracing

the spread of the κοινή with its -σσ-. The earliest inscriptions show I, which, as I said above, I take to represent š. The Gortyn inscription shows -ττ- like Attic and Boeotian; but Cretan approaches more closely to Boeotian than to Attic in two points: First, the dental š does not become *s* in μέσος, etc., and second, the group dental+*s* becomes -ττ-; e. g. Cret. aor. ἐδατταμαν, beside pres. δατηθαι, Boeot. aor. κομιττάμενος. I do not believe that these are cases of assimilation of spirant to stop: *ts* rather became *tš*—š; the archaic ἀνδαζαθαι preserves this stage; and then š became þ later, like the š from κ*ι*, τ*ι*. The third stage of Cretan shows θθ for the -ττ- of Gortyn and the archaic I, in θαλαθθας, ὀθθακιν (Mus. Ital. III, p. 681), Ἀρκαθθι (op. cit., p. 691), the dat. plur. with θθ from δ+*s*, like ττ in ἐδατταμαν of the Gortyn inscription and I of the archaic ἀνδαζαθαι. If θθ was merely a graphic variation of ττ to represent þ, as I think, this is conclusive against the theory of assimilation of *s* to *t*. This third stage shows θθ also for στ in ἰθθᾶντι (Cauer, Del.[1] 42), a change most curiously paralleled in the Boeotian ἴττω of Aristophanes, and ἔττε for ἔστε at Orchomenus. J. and T. Baunack, to explain ἰθθᾶντι, assume the stages στ—þτ—þþ; this may be quite correct, since there is no necessity to explain -θθ- from -στ- on the same principle as -θθ- from dental+*s*; for the regular appearance of -στ- in the Gortyn inscription, e. g. in κατισταμεν, shows that the passage of στ to θθ was much later than that of dental+*s* to ττ, θθ. It is to be noticed, however, that even in archaic Cretan, σ is assimilated to a following θ.

Dr. Blass has an article in the Jahrbücher f. Philologie for 1891, p. 1 seqq., on an inscription from Phaistos in Crete, containing the words ΠΡΑΤΕΙ and ΕΥΓΛΟΘΟΙ (?), which he assigns to the first century B. C., but which Halbherr, who first edited it in Mus. Ital. III, p. 559, assigns to the third century B. C. In his article he advances the view that θ was the hard explosive aspirate in Cretan even at this late date, and that ττ in the Gortyn inscriptions was a double stop. He then explains

Gortyn *Ἀρκαττι (analogous to ἐδαττάμαν) : later Ἀρκαθθι
Gortyn πράδδει : later πρατ(τ)ει

by assuming "eine art lautverschiebung," though he admits that this new "Grimm's Law in Greece" does not affect the aspirate θ. If, however, we may believe, on the authority of Meister, the Baunacks, Comparetti, and Dr. Blass himself in his Aussprache,

that θ was þ in Cretan as early as the Gortyn period, these forms can be otherwise explained. At that period Cretan possessed an inter-dental spirant, θ, developed from the dental aspirate, and a supra-dental spirant, ττ, developed from the spirant s̆. At a later period these two sounds were confused, and were both written θ or θθ. Hence πορτιαθθαν (Mus. Ital. I, p. 44) = προσοῦσαν || Gortyn ἰαττα. If the forms πρατ(τ)ει, ἐσπρεμιττεν = Attic ἐκπρεμνίζειν, κἀπολογιττεθθω, quoted by Dr. Blass, belong to this period, we must put them alongside the form Ττηνα, Doric Δᾶνα, Attic Ζῆνα, and assume that when ττ ceased to represent þ, it was used instead of δδ to express z̆.

The history of initial $k_{\breve{\imath}}$, $t_{\breve{\imath}}$ is not so easy to trace. In the first place, the materials are scanty; secondly, the need of expressing the syllable weight of a final short vowel preceding was not felt to be sufficient to justify the use of a doubled initial σ, so that it is difficult to distinguish between s, ${}^{t}\check{s}$, and ${}^{k}\check{s}$ when initial; thirdly, dentalized gutturals cause further ambiguity; e. g. how can it be determined whether Megarian σά = τίνα came from $*_{k_{\breve{\imath}}a}$ or from $*_{t_{\breve{\imath}}a}$? We have from $k_{\breve{\imath}}$ or $t_{\breve{\imath}}$ Ionic σ- in σεύω; this σ frequently makes position in Homer, and lengthens the augment in every case but one. In this it appears to have the value s̆; those cases in which a short vowel remains short before σεύω may be explained partly by assuming a poetic license, similar to but perhaps not so harsh as that by which Σκάμανδρος appears in hexameter verse, partly by supposing that the poet attended occasionally rather to the written form of the word than to its pronunciation. As regards syllable weight, I equate s̆ exactly with ρ, and initial ρ does not always lengthen a preceding short vowel. Brugmann connects doubtfully with σεύω the Attic τευτάομαι, τευτάζω, explaining the initial τ- as a shortening of -ττ- which would have appeared in the augmented and reduplicated forms. But if initial σ in Ionic σεύω was s̆,—and we can hardly suppose that the sibilant of ἔσσευε was s̆, while that of ὅτε σεύαιτο was s—why should not initial τ of Attic have had the same value as medial -ττ-? Another example from $k_{\breve{\imath}}$ or $t_{\breve{\imath}}$ is the Megarian σά quoted above, to which corresponds the Attic enclitic -ττα, as in πόσα ττα, whence, by wrong division, ἄττα. If -ττα had ever followed a consonant, would it not have been written -τα?

From $t_{\breve{\imath}}$ we have Ionic σήμερον, σῆτες (in Etym. Mag.) beside Att. τήμερον, τῆτες. The origin of these forms from the pronominal stem which appears in Skt. as *tya-* would support the pronunci-

ation of initial *σ-*, *τ-* as š and þ but for the fact that there exist many little-understood cases of Attic initial *τ* corresponding to Ionic *σ-*, where the origin of the two sounds seems to be *tṷ*; e. g. *τύρβη*, Ionic *σύρβη*, *τηλία* || *σηλία*, *διαττάω* || *σάω*: with these must be grouped the forms *τύ* || *σύ* and *τέτταρες* beside *τέσσαρες*. These forms are quite separate from those discussed in this paper. Whether the *-ττ-* of *τέτταρες* and *διαττάω* represented a double stop or a spirant, and what was the process of its development from *tṷ*, I cannot at present determine.

It will be seen that in the theory of *-σσ-* given above, I have not hesitated to ascribe more than one value to a single Greek sign in one and the same alphabet. The assumption that the Greek alphabet, like most others, did not possess sufficient consonant signs to represent accurately all the sounds of the language which was written in it, is one that has been frequently made by philologists and passed over without notice. The assumption is, I think, quite justifiable, for it would be a miracle if a borrowed alphabet could express all the sounds of the language that borrowed it. The fact that some of the Greek symbols were conventional, e. g. *-σσ-*, *-ττ-*, *-δδ-*, which, it must be remembered, were not distinguished in writing from *-σ-*, *-τ-*, *-δ-*, in early times, is to me less surprizing than the fact that the Greeks themselves do not appear to have thought the matter worthy of remark.

This assumption, then, I make in the case of *ζ*, for no one value has ever yet been proposed for this sign which is satisfactory in every case in which the sign appears.

The following points appear to me clear with reference to the pronunciation of *ζ*:—(i) that in *ἵζω*, *Ἀθήναζε*, Boeot. *θεόζοτος*, etc., it was *zd*. *ἵζω* preserves I.E. *zd*, while the other two forms are late compounds. (ii) that after the time of Alexander (see Blass, Ausspr., p. 91) it was dental *z* in *Ζμύρνα ζβέννυμι*, etc. (iii) that in other forms it was neither *zd* nor *z*. Take, to begin with, the Epic-Ionic-Attic *ζ* in *φύζα*, *σχίζα*, *κράζω*, *πεμπάζω*. In these cases *ζ* is manifestly the outcome of I.E. *dį̑*, *gį̑*, and many attempts have been made to bridge over the gulf between these sound groups and the sounds *zd*, or *z*. Blass (p. 125) assumes the series *dį̑*—*dz*—*zd*, the last change being due either to metathesis or to the analogy of I.E. *zd* in *ἵζω*. Both steps are difficult, for *dz* is a long way from *dį̑*, and the conversion of *dz* to *zd* is almost impossible. G. Meyer (Gr. Gr.[3], §284), recognizing this, derives *zd* straight from *dį̑*, in defiance of the law "Natura saltum non

facit." He justifies the change by appealing to the O.C.S. *žd* from *dį̄*. But (i) O.C.S. is a long way from Greek; (ii) *ž* is not *z*; (iii) at best this is only *ignotum per ignotius*. I would explain O.C.S. *žd* by equating the *ž* to the *dį̄* and assuming the *d* to be parasitic. Hoffman (Die gr. Dialekte, II, p. 512) argues that original *ζ* = *dz* must have become simple *z*; he obtains the required value *zd* by the series *dį̄—dz—z—zđ—zd*. He does not say whether all these changes were proethnic; he does not parallel the adventitious *đ*, whereas in O.C.S. *št* from *tį̄* does parallel *žd* from *dį̄*, nor does he explain why it passed from spirant to stop, and that, too, after a spirant. If, then, it is only with the greatest of difficulty that *zd* can be obtained from *dį̄*, it would seem to be quite impossible to obtain it from *gį̄*. The parallel between *kį̄*, *tį̄* and *gį̄*, *dį̄* seems to me to be quite close. Just as the former pair meet at the sound *š*, which passes in certain dialects to *þ*, so the latter pair, as I think, meet at the sound *ž*, which passes in Doric to *đ*. Now the place of articulation of the sound *ž* is no more fixed than is that of *š*, and, furthermore, it shades off into other spirantal sounds. Modified in the front it becomes *đ*; another modification produces *z*. At the back of the mouth it produces spirant *ȝ*, the spirant of the German *morgen*; this in its turn can pass into spirant *y* or semivowel *į̄*, as it has in the English *yesterday*, Boeotian *ἰών* = *ιμων* for *ἐγών*, and Tarentine *ὄλιος* for *ὀλίγος*. Every one of this series of connected sounds has some bearing on the history of the symbol *ζ* in Greek.

I shall first give evidence for the existence of the sound *ž* in Greek, and then consider the value of *ζ* in the different dialects. My evidence is drawn partly from transliteration, partly from phonetic considerations.

Early Latin transliterations give but little help, since the symbol *z* had become obsolete in the Latin alphabet, at an early period. Latin accordingly had no symbol wherewith to represent the Greek *ζ*, except *s*, which we find in *Saguntum*, and the Plautine *sona*, *tarpessita*, *badisso*, *comissor*, etc. A curious, but probably quite accidental, resemblance to these last two forms is seen in the Tarentine *σαλπίσσω*, *φράσσω*, etc., with *-σσ-* for Ionic-Attic *ζ*. This gives rise to the supposition that the Tarentines had transformed their *-ζ-*verbs to *-σσ-* by analogy, like the Attic *ἁρμόττω* and Thessalian *ἐνεφανισσοεν*; but we have one Tarentine verb in *-ζω*, namely *ἀνάζω*, and by derivation that should have *-σσ-*.

Without assuming a 'lautverschiebung' in Tarentine, I suggest that here the signs *-ζ-* and *-σσ-* had interchanged values, *ζ* being pronounced *š*, and *-σσ-* as *ž*. Such variations, whether due to analogical transference of forms or confusion of alphabetical symbols, certainly point to a closer resemblance between *-σσ-* and *-ζ-* than exists between *-ss-* and *-zd*. Early Latin can thus give us but little assistance, but some light is thrown on the question by the correspondence of Late Latin *z*, Greek *ζ*, to classical Latin consonant *i* and *g* before *e*, and *i*, and *d* before *i*. Lindsay (Lat. Lang., p. 49) considers that the sound in these cases was *y*, and that Latin *z* and Gk. *ζ* were then pronounced *z*. The subsequent history of the sound he gives as follows:

Lat. consonant *i*
Lat. *ge, gi*
Lat. *di*
→ Low Lat. *y* (written *z*) →
French *j* (= *ž*)
Italian *gi* (= *dž*)
S. Italian } *y*
Spanish }

But the disparity between the sound and the sign in Low Latin, together with the fact that French and Italian have now a sound which is closer to the original Latin than is this postulated Low Latin *y*, makes me think that the following series more closely represents the facts of the case:

Lat. consonant *i*
Lat. *ge, gi*
Lat. *di*
→ Low Latin *ž* or *dž* (written *z*, or *ζ*)
French *j* (= *ž*)
Italian *gi* (= *dž*)
ʒ—S. Italian
Spanish } *y*

So that the people who wrote for Latin *Iulia*, Greek Ζουλεια had not such a bad ear for sounds as to write *z* when they meant *y*: they pronounced the name as a modern Frenchman or Italian would pronounce it. Roby (Lat. Gram. I, §195) assigns the value *dž* or *ž* to Late Latin *z* in these cases.

The passage of consonant *i* to *ž* through the stages *i̯—y—ʒ—ž* is illustrated by the Sanskrit *hariya*, transliterated from Greek ὁρίζων (Wackernagel, Alt. Ind. Gramm., pp. 137, 242). This, however, does not support the value *y* for *ζ* in Ζουλεια, inasmuch as transliteration out of a language is a vastly different thing from transliteration into it. For example, if Greek possessed a sound *ž*, another language, having no *ž*, might transliterate it as *y*; but that *y* would not be written *ž* in Gk., but probably *i*. Greek *ζ* represents, not Sanskrit *y*, but a palatal consonant, in 'Οζηνη = *Ujjayini* (Blass, Ausspr., p. 128).

The Sanskrit language paid more attention to phonetics than any other that has ever existed; is it likely that it would have represented *zd* or *z* by *y*? The nearest equivalent to *z* in Sanskrit would be *s*; the nearest to *ž* would be palatal *j* or semivowel *y*.

According to Meyer (Gr. Gr.[3], §226, note) *στ* is employed on papyri to represent Arabic and Coptic *š*. Granting the difficulty that any Aryan tongue would find in accurately reproducing a Semitic sibilant, still *szd* seems a very weak attempt to represent any kind of a *š* sound: *sž* is at least intelligible.

As inscriptional evidence I may cite the archaic Cretan I, referred to with reference to the value *š*. I sought to prove that in three cases out of four it had that value; in the fourth case it represents a voiced sound, which I take to be the voiced counterpart of *š*, namely *ž*.

From Cyprus come the forms *ἀζαθὸς* and *ζὰ*, where *ζ* represents the spirantized *γ*, that is *ʒ*.

The Cyprian *κορζα*, Aeolic *κάρζα*, *ζὰ* = *διά* show *ζ* as a late formation from *δi̯*; the sound here was probably Eng. *j*, that is *dž*, or perhaps *ž*.

So far I have treated only of *ζ* from I.E. *di̯*, *gi̯*; but *ζ* from I.E. spirant *y*, in *ζυγόν*, *ζέω*, can also be explained as *ž*. Sievers defines the difference between semivowel *i̯* and spirant *y* as due to greater friction. Whether that greater friction is produced by narrowing the air-passage or increasing the pressure of the air-current, the same process that produces *i̯* from *i* will, if continued, produce *ʒ* from *i̯*. If we give this value, *ʒ*, to I.E. *y*, its representation by Gk. *ζ*, that is *ž*, no longer needs to be explained by a complicated process such as that given by Meyer, *j—dj—zd*, which obscures the difference between I.E. *i̯* and I.E. *y*. The passage from the spirant to the semivowel in other languages is readily paralleled by the English *yesterday*. This distinction between the palatal semivowel *i̯* and the palatal spirant *y* (= *ʒ*) is the same as that between the labial semivowel *u̯* and the labial spirant *β̌*.

Just as the voiceless *š* was lisped to *þ* (*ττ*) in Attica, Boeotia and Crete, so the voiced *ž* was lisped to *ð́* (*δδ*) throughout the entire range of the Doric dialect; e. g. Laconian *μουσίδδει*, Megarian *μάδδαν*, both in Aristophanes; Cretan (Gortyn) *δικάδδω*, Boeotian *τράπεδδα*; initial *δ* = *ð́* is seen in Laconian *Δάν*, Cretan (Gortyn) *δώη*, = Boeotian *δώει*, Sicilian *Δάγκλη*. And just as the supra-dental *-ττ-* was confused in Crete with inter-dental *θ*, so in Elean supra-dental *-δδ-* was confused with inter-dental *δ* = *ð́*.

In Aeolic we find ζ = Ionic-Attic ζ written on inscriptions; it is also attested by grammarians as the sign employed for the sound arising from the late union of δι in κάρζα, and ζὰ = διά; the symbols -σδ- also occur in such forms as μελίσδειν, Σδεύς, given by MSS and grammarians; the first inscriptional evidence for it is on an archaising monument of imperial times.

Meyer (Gr. Gr., l. c.) explains σδ as due to the fact that ζ, formerly *zd*, had become *z* in the rest of Greece, and that Aeolic, preserving the sound *zd*, adopted a new sign to represent it. My objections to this are as follows: (i) I hold that Meyer has not substantiated the value *zd* for ζ in all cases, especially from *gi̯*. (ii) It remains to be proved that ζ was simply *z* in the rest of Greece. (iii) On Meyer's own theory ζ in Aeolic κάρζα, etc., was *z*; but *z* does not arise directly from *di̯*: the stages are *di̯*—*dž*—*ž*; a further step, and no inconsiderable one, is necessary to arrive at *z*. (iv) Although a dialect might adopt a sign which it did not possess, from another dialect, it would hardly discard a sign which it did possess, because another dialect used it with a different value. According to my theory Aeolic ζ was *zd* or *ž* down to quite late times: the spelling σδ was due to confusion of the two values; θεόζοτος and θεόσδοτος were equivalent, so beside δικάζει arose δικάσδει, with σδ = *ž*. What, then, became of the discarded symbol ζ? It may have been employed to represent the affricate *dž* in κάρζα.

The σδ of the Sicilian Doric of Theokritus is probably merely a literary form. The Doric -δδ- seems to have been entirely banished from elevated literature, its place being taken either by the Ionic ζ or the Aeolic σδ. That σδ was foreign to Sicilian might be taken for granted, were it not for the Oscan Νινμσδιηις, which occurs in a Mamertine inscription at Messana, written about 280 B. C. (Conway, Italic Dialects, No. 1). The alphabet is that form of the Ionic alphabet which came into general use in S. Italy. Two conjectures are open: we may suppose that the sound to be represented, namely Oscan intervocalic -*s*-, corresponded to the value of the Greek ζ, but that it was the fashion at that time in Sicily to represent this by -σδ-. Of such a fashion we have no other evidence except the conflicting spelling of the MSS of Theokritus. Secondly, if we suppose that the Oscan -*s*- corresponded to no value of -ζ-, that was known in S. Italy, the -σδ- would be an isolated attempt to represent Oscan -*s*-. If there was any connexion between this Oscan -σδ- and Aeolic -σδ-,

the sound in Oscan, on Meister's theory, would be *zd*, which is obviously impossible; while if Aeolic -σδ- was merely a graphic variant for ζ = ž, we must believe that Oscan *-si-* was pronounced *-ži-*, which is possible without being probable. On the whole it seems best to treat the two as independent.

The question of the value of the symbol -ζ- in Elean is a curiously complicated one. In the inscriptions of the earliest period ζ appears for I.E. and Ur. Gk. *d*; apparently *d* had been spirantized to *đ*, and I explain the use of the symbol ζ in this manner:—Just as there was a period before -σσ- (š) became -ττ- (þ) in Attic, so there was a period before -ζ- (ž) became -δδ- (đ) in Doric. In Elean the change of sound was not at first accompanied by a change of sign. That is, ζ = ž became ζ = đ, where the origin of the sound was I.E. *di̯*, *gi̯* or spirant *y*. Then, when Ur. Gk. *d* became *đ*, this too was written ζ. Unfortunately, the early inscriptions contain no sure example of a representative of I.E. *di̯*, *gi̯*, *y*. In my opinion ζ would be found in these cases, with the value *đ*. Inscriptions after the 5th century show the ordinary Doric spelling -δδ- for ζ, and δ for *d*; those at the end of the 5th century represent a transition period; the sign is usually δ, with rare lapses to the older ζ. For the whole question cp. Meister (II, p. 52), from whom I quote the following: "Dass diese beiden spirantischen Laute des eleischen Dialekts, der durch ζ (ζᾶμος = δῆμος) und durch δ, δδ (δυγον = ζυγόν) bezeichnete sich unterschieden, ist für gewiss anzunehmen, denn wären sie zusammengefallen, so würde man sie nicht durch verschieden gewählte Schreibung auseinander gehalten haben; worin aber der Unterschied bestand lässt sich nicht erkennen." To this I would reply that there may have been a difference of sound, namely, that between inter-dental *đ* and supra-dental *đ*, but the difference was never expressed. The difference of sign is chronological: it does not appear in any inscription except those two of the transition period, one of which shows ζ once (in ζὲ = δὲ) with 10 cases of δ unaltered, while the other shows one ζ with 20 cases of δ.

Arkadian shows ζ = I.E. *di̯*, *gi̯*, *y*; e. g. δικαζηται (Meist. II 106; Cauer², 457). A difficulty arises from the appearance of ζ = I.E. velar g in ζέρεθρον (Strabo, VIII 8. 4 (p. 389); Meyer, Gr. Gr.³, p. 266). The stage previous to ζέρεθρον could not have been δέρεθρον, since Arkadian preserves Ur. Gr. δ unchanged. The only other similar form is ζέλλω = βάλλω, given by Hesychius without a

locality. The two forms seem to contain a peculiar product of velar ɡ: since it is not a case of dentalization, it seems possible that it arose from a spirantizing of γ, seen also in Cyprian, which γ must have appeared beside the regular representatives of ɡ^{w} as it does in γλέφαρον and γέφυρα; δ appears in ἐσδέλλοντες (Collitz, 1222. 49). Under what conditions δ and ζ appear respectively cannot be determined with such scanty material. The only other view is that Arkadian contained a mixture of dialects.

I have now to treat of the metrical weight of the sounds represented by -σσ-, -ττ- and -ζ-. In the first place it must be remembered that any continuous consonant can, in the Epic dialect, make a metrically long syllable when following a short vowel. A stopped consonant has not this power, except in very rare cases. In these cases, then, the difference between a heavy syllable and a light syllable depended on the difference between continuous and stop consonant. That is, the greater amount of time spent, or breath used, in the production of a continuous consonant made the syllable containing it long as compared with a syllable containing a stop. In the later language, however, the continuous sounds *l*, *m*, *n* and dental *s* were no longer able to give metrical weight; and such combinations of stop and continuous sound as *tr* were treated in the same fashion. The change was, perhaps, not so much a change of pronunciation, although the sibilant of ἐδίκασσα may have been dwelt upon longer than that of ἐδίκασα, but was rather due to a change in the feeling of what constituted metrical weight. The other continuous sounds retained their power of making metrical weight even in classical Greek; ρ, σσ (= š), ζ (= ž), and -ττ- (= þ) and -δδ- (= đ) regularly "make position," and the reason is not difficult to see. The production of these sounds needs a more open position of the vocal chords, and consequently involves a greater muscular exertion and consumption of breath than does that of *l*, *m*, *n*, *s*. The sound ž or ʒ has a more open position than any other sound not a vowel. Consequently it produced a heavy syllable in Greek; and its effect in the pronunciation of English is analogous. Compare the long vowel of *please* with that of *pleasure*, *Asia* with *azure*, *mete* beside *measure*.

To the Greek of the 6th century B. C. this difference of syllable weight afforded the most striking contrast between the sounds *s* and š. It was the point on which the different alphabetical representation was based. Consequently it is not surprizing to find

that as the language decayed, and syllable weight disappeared before the stress accent, the difference between *s* and *š* likewise disappeared, so that no trace of it survives in Modern Greek. But, in my view, the sounds *š* and *ž* lasted at least long enough to account for the spellings *malaxo* and Ζουλεια.

In conclusion, I may briefly summarize my position as follows: (*α*) The present views on -σσ-, -ζ-, -ττ-, -δδ- are unsatisfactory because—

(i) τελέσσαι and πράσσειν could not both have been pronounced with dental *s*.

(ii) The series commonly given to show the development of κ̯, etc., in Gk. contain too many phonetical difficulties, and

(iii) they separate τ̯ from κ̯ and both from δ̯, γ̯, although -σσ- unites the first pair, and the interchange of -σσ- with -ζ- and the correspondence -ττ- || -δδ- unites the voiceless with the voiced series.

(*β*) Since a new theory is necessary, the values *š*, *ž* suggest themselves as the representatives of Ur. Gk. κ̯, etc., because—

(i) κ̯, τ̯ naturally converge to *š*.

γ̯, δ̯, *ȝ* (= I.E. *y*) naturally converge to *ž*.

(ii) Archaic Cretan I in Ϝοιζηα shows dialectic growth of *š* from palatalized κ.

Archaic Cretan I from dental + *s*
Gortyn Cretan ττ " "
Boeotian ττ " "
} shows dialectic growth of *š* (⇒ *þ*) from τσ.

Cyprian ζ in ἀζαθὸς shows dialectic growth of *ž* from *ȝ*.

Aeolic ζ in καρζα
Cyprian ζ in κορζα
} shows dialectic growth of *ž* or *dž* from δ̯.

(iii) It is quite possible that the Semitic symbols should, when adopted, have the values assigned to them by my theory, and probable that in the sign T we have the fourth Semitic symbol with the fourth Semitic value.

(iv) *š*, *ž* and supra-dental *þ*, *đ* resemble *r* in their phonetic character as in their metrical effect.

(v) Transliteration, where it gives any help at all, favours my theory, especially transliteration into and from the most scientific of all alphabets, the Sanskrit.

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